WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau



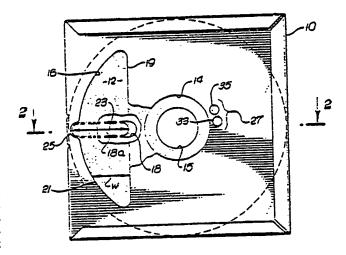
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 3:	1	(11) International Publication Number: WO 82/00731
G11B 5/41	A1	(43) International Publication Date: 4 March 1982 (04.03.82)
(21) International Application Number: PCT/U: (22) International Filing Date: 20 August 1981		del), DE (European patent), PR (European patent),
(31) Priority Application Number:	180.9	Published With international search report
(32) Priority Date: 25 August 1980	(25.08.	0)
(33) Priority Country:		JS
(71) Applicant: INNOVATIVE COMPUTER PR [US/US]; 18360 Oxnard Street, Tarzana, (US).	CA 91	TS 65
(72) Inventor: DAVIS, C.,Paul; 22643 Sylvan Str land Hills, CA 91367 (US).	eet, Wo	od-
(74) Agent: LUBITZ, Stuart; 1880 Century Park 500, Los Angeles, CA 90067 (US).	East, S	ite
·		

(54) This: NON-ABRASIVE MAGNETIC HEAD CLEANING SYSTEM

(57) Abstract

A cleaning system for flexible disk (12) equipment or the like. The system includes a cleaning disk made of an absorbent and porous fibrous material which has an area substantially saturated with a liquid cleaning solution. The cleaning disk (12) is rotatably supported within a flat jacket (10). The jacket includes opposed openings on either side so as to expose a portion of the cleaning disk to enable the disk to come into contact with a magnetic head or heads. At least one of the openings is enlarged to expose a relatively large portion (16) of the surface of the cleaning disk, so as to facilitate complete saturation of an area of the cleaning disk with a liquid cleaning solution while leaving a portion of the cleaning disk dry. The jacket (10) containing the disk (12) is placed within a flexible disk system which rotates the saturated disk, thus causing the magnetic head(s) (22) to be cleaned in a non-abrasive fashion with a wet, dry, wet action. An improved jacket for use with a thickened cleaning disk (12) is also disclosed.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	KP	Democratic People's Republic of Korea
	Australia	ü	Liechtenstein
AU		ĹŬ	Luxembourg
BR	Brazil		Monaco
CF	Central African Republic	МC	•
CG	Conto	MG	Madagascar
CH	Switzerland	.MW	Malawi
CM	Cameroon	NL	Netherlands
DE	Germany, Federal Republic of	.00	Norway
DK	Denmark	RO	Romania
FI	Finland	SE	Sweden
FR	France	SN	Senegal
GÃ	Gabon	รข	Soviet Union
GB	United Kingdom	110	Chad
HU	Hungary	TG	Togo
JP	Japan	US	United States of America

1..

NON-ABRASIVE MAGNETIC HEAD CLEANING SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to systems for cleaning the magnetic head(s) in flexible disk systems. With flexible disk drives, as with other pieces of data processing equipment, preventive care and periodic maintenance are necessary to insure efficient, smooth and error free operation. Unlike other peripheral devices, the magnetic heads on flexible disk drives are extremely difficult to access without partially disassembling the drive system. Due to this difficulty, head cleaning is generally done only when read/write problems are being experienced.

2. Prior Art

Several systems have been developed in an attempt to provide a convenient means of cleaning the head(s) on flexible disk systems. One such system utilizes two flexible disk jackets. One of the jackets contains an abrasive lapping material, and the other contains a cleaning cloth material. The first jacket is inserted into the flexible disk system and run through the machine for a predetermined amount of time (generally no longer than ten seconds in order to avoid damage to the magnetic head from the abrasive material) so as to loosen debris from the head. The second jacket is then run through the machine so as to pick up the loosened debris. The flexible disk jackets which are used contain standard size openings (i.e. thin radial slots) in order to allow the heads and pressure pad to contact the cleaning material.

A second system, described in IBM Technical Disclosure Bulletin Vol. 20, No. 8, January 1978, utilizes a standard flexible disk jacket and substitutes an abrasive disk for the normal magnetic disk. The abrasive disk is coated with either



chromic oxide (CR_2 0_3 having a diameter of less than .7 microns or aluminum oxide (AL_2 0_3 of the same diameter. The assembly is used to initially lap the magnetic heads of flexible disk drives and subsequently remove contaminant build-up on the head(s).

A third system for cleaning magnetic heads is disclosed in U.S. Patent No. 4,065,798 issued to Sugisaki et al., on December 27, 1977. This system includes a laminated disk which has a flexible non-magnetic support (e.g., polyvinyl chloride) coated with a magnetic layer on one side and a fibrous cleaning material on the other side. The cleaning disk is located within a cartridge which contains a lubricating layer facing the magnetic layer of the cleaning disk, and includes a normal radial slit which allows the magnetic head to contact the fibrous cleaning material.

It is therefore an object of this invention to provide a system for cleaning the magnetic head(s) of flexible disk drive machines without the need for any disassembly of the machine.

It is another object of the present invention to provide a head cleaning system which is substantially non-abrasive and will therefore not harm the magnetic heads in any way.

It is another object of the invention to provide a head cleaning system which permits the use of a liquid cleaning solution.

It is a further object of the invention to provide a head cleaning system which may be left engaged in a disk drive machine for long periods of time without damage to the magnetic heads.



SUMMARY OF THE INVENTION

These and other objects are achieved by providing a head cleaning system which includes a cleaning disk made of an absorbent lint free and porous material which has an area substantially saturated with a liquid cleaning solution and a dry area. The cleaning disk is rotatably supported within a jacket that includes opposed radial openings on its upper and lower surfaces for exposing the cleaning disk to the magnetic head of a flexible disk system (or both magnetic heads if the drive system is equipped for dual sided flexible disks). At least one of the openings exposes enough of the surface of the cleaning disk so as to facilitate saturation of approximately 1/8 to 1/2 of the cleaning disk area with the cleaning solution without requiring removal of the disk from the jacket. As the disk rotates a wet/dry/wet/dry surface is presented to the head(s) which provides an effective non-abrasive cleaning. Also, the formulation of the solution is such that it evaporates during the predetermined cleaning cycle (generally less than three minutes) insuring that the head(s) are dry and clean. The porous nature of the cleaning disk facilitates the collection of foreign particles.

The saturation opening exists on only one side of the jacket while the other side of the jacket has a perforated oblong section. This perforated section remains intact as to single head disk drives and dual head disk drives where the heads are not in direct opposition to one another. The oblong perforated section is removed to form an opening for cleaning a head when the jacket is employed in dual head disk drives where the heads are in direct opposition to one another. More specifically, the saturation opening in the jacket which exposes the cleaning disk should have a configuration that provides adequate support for the cleaning disk, thereby avoiding any substantial sagging of the cleaning disk which would interfere with the disk drive and



hamper removal of the cleaning system. This support should be provided while exposing an adequate area of the cleaning disk for saturation. One means for accomplishing such support is the forming of an opening in the jacket which inherently provides support to the cleaning disk. Such openings in general have at least one major boundary which is more generally chordal as distinguished from radial or concentric. The other major boundary generally tends to be more curvilinear although not necessarily circular.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, wherein like numerals refer to corresponding components in the several Figures:

FIGURE 1 is a top plan view of the cleaning system of the present invention;

FIGURE 2 is a side view, in section, of the cleaning system of the present invention shown in position to clean the magnetic head of a single disk drive system;

FIGURE 3 is a top plan view of an alternate embodiment of the cleaning system of the present invention; and *

FIGURE 4 is a side view section taken along lines 4 - 4 of FIGURE 3.

FIGURE 5 is a side view, in section, of the cleaning system of the present invention shown in position to clean the magnetic heads of an opposed dual head type drive;

FIGURE 6 is a side view, in section, of the cleaning system of the present invention shown in position to clean the magnetic heads of an offset dual head type drive;

FIGURE 7 is a perspective view of an alternate jacket design;

FIGURE 8 is a side view, in section, of the jacket of FIGURE 7; and

FIGURE 9 is a top plan view of a further alternate embodiment of the invention.



PCT/US81/01132 WO 82/00731

5.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to FIGURE 1, the present invention includes a jacket 10 which rotatably supports a cleaning disk 12. The material used for the jacket 10 may conveniently be the standard vinyl-like material which is utilized for normal magnetic floppy disk jackets. Other materials are also within the scope of the present invention. The cleaning disk 12 is made of a lint-free, absorbent material of a porous nature so that contaminants and debris picked up from the head(s) are trapped and held by the cleaning disk surface. Preferably, the disk 12 is made from a lint free fibrous porous material having a white or other light color so that an operator may easily tell when the disk 12 needs replacement by checking it for discoloration. The cleaning disk 12 should be relatively resistant to wear so that several cleanings can be accomplished with the same disk. Materials which may be used for the cleaning disk 12 include, but are not limited to, spunbonded polyester (e.g., Dupont Reemay) or spunbonded olefin.

Referring further to FIGURE 1, the jacket 10 includes a center opening 14 for accommodating a drive shaft of a disk drive system. Similarly, the cleaning disk 12 includes a center opening 15 through which a drive shaft passes. The jacket 10 includes an enlarged opening 16 which exposes a portion of the disk 12 of approximately 1/8 - 1/2 of its cleaning area and preferably approximately 1/4. The opposite side of the jacket 10 contains a perforated thin radial section 18a which is left in place when the invention is used to clean single head drives. If the disk drive has two heads, the perforated radial section 18a is removed, exposing opening 18, so that both heads can be cleaned at the same time. When cleaning single head drives, the perforated radial section 18a is not removed because the solution and cleaning material could damage



The control of the co

6.

the pressure pad of certain models of disk drives. It is, of course, possible to devise a pressure pad construction that would not be so damaged.

The openings 16 and 18 serve to expose the surface of the cleaning disk to the magnetic head of a disk drive system, or to two magnetic heads in the case of a dual-sided disk drive system. The enlarged opening 16 is provided to facilitate saturation of a suitable portion of the cleaning disk 12 with a cleaning fluid in one application without requiring the removal of the cleaning disk 12 from the jacket 10 or rotation of the disk 12. Depending upon the absorbency and wetting action of the material of the cleaning disk 12, the size of the opening 16 may be either smaller or larger than the size shown. Generally, with the aforementioned materials the opening will be sufficient if it exposes approximately one quarter of the surface of the cleaning disk 12. The basic purpose is to permit the application of cleaning fluid through the opening 16 which will then be absorbed by the cleaning disk 12 over the appropriate portion of its surface. If the jacket 10 contained thin radial slots which are typically for magnetic disk jackets (i.e., approximately the size of the opening 18), it would be difficult, if not impossible, to properly saturate the cleaning disk 12 in one application. Rather, a small portion of the disk 12 would have to be saturated and then the disk 12 would have to be rotated so as to expose another unsaturated portion. This process would have to be continued until the appropriate portion of the cleaning disk 12 were saturated with cleaning fluid. When a volatile cleaning solution is employed there is the problem of the solution quickly evaporating before cleaning commences. Since the material used for the disk 12 is absorbent, the size of the opening 16 facilitates quick saturation in one application while still allowing the jacket 10 to support the disk 12.



WO 82/00731 PCT/US81/01132

7.

In addition to the size of the opening 16, it has been determined that the configuration of the opening is also of significance. It is preferred that opening 16 have a configuration such as shown in FIGURE 1. The configuration of opening 16 has a generally straight or chordal portion 19 and an adjacent area that provides support for the cleaning disk 12. The portion 19 of opening 16 is connected to a curved portion 21 that is generally separated from the portion 19 by a decreasing dimension or width W. The maximum dimension should be at least large enough to enable the entire head of the disk drive to be cleaned by the cleaning disk. In the preferred embodiment this occurs at the diametrical width 23, which includes a radiused or circular portion 25 contiunous with curved portion 21.

Alternate configurations of opening 16 may be employed provided saturation of the disk is facilitated, while the support of the disk and jacket is maintained so as to minimize planar distortions (sagging, etc.) that may interfere with the insertion and removal of the cleaning system. For example, the opening 15 may be generally triangular, elliptical or rectangular. The rectangular configuration involves some disadvantageous compromises which may be tolerated or which may be overcome by the addition of a second saturation opening.

In a single head disk drive the side of the cleaning disk not in contact with the head is completely supported
by the pressure pad. In a dual-head disk drive with the
heads in direct opposition to one another, the perforated
portion 18a is removed and the second head projects through
the opening 18 formed by the removal of the perforated portion 18a. This opening may conveniently be the same size
and configuration utilized on standard floppy disk jackets.
Any other configuration which enables the entire head to be
cleaned would also be acceptable.

BUREAU OMPI WIPO

The second secon

In certain dual-head disk drives, the heads on opposite sides of the disk are offset with respect to one another, with a pressure pad being located in opposition to each head. In order to clean disk drives with such head arrangements without engagement of the pressure pads, the same jacket may be employed with a thicker cleaning disk, which would enable both of the heads to contact the cleaning disk without the pressure pads engaging the disk. In this manner, cleaning of both heads simultaneously without interference from the pressure pads is facilitated.

Referring further to Figure 1, a plurality of holes 27 in the jacket are employed to enable the cleaning device of this invention to simulate a magnetic disk and thereby enable the disk drive to be rotated and controlled in the same manner as if a magnetic disk were positioned in the system. The different holes are for different types of disk drives. For example, the hole 33 is employed in a single—sided single—head drive while the hole 35 is employed in double—sided disk drives such as those employing opposed heads. A compatible hole or holes are formed in the cleaning disk. Of course, other hole configurations for use with different types of drives are within the scope of the invention.

Many types of cleaning solutions may be used to saturate the disk 12. For example, a typical isopropyl alcohol or a mixture of isopropyl alcohol and a flourocarbon (e.g., freon) could be utilized. Any solution may be employed that: has solvent properties such that it dissolves common contaminants found on heads, does not leave a residue on the heads, and evaporates during the predetermined cleaning cycle (e.g., less than three minutes). In the preferred embodiment the cleaning solution evaporates in less than 90 seconds when rotated by a commercially available floppy disk drive.

Referring now to FIGURE 2, the cleaning system is shown in engagement with a single head drive system 20. After a portion of the cleaning disk 12 is saturated with cleaning solution via opening 16 the cleaning system is inserted in drive 20, where a magnetic head 22 contacts one side of the cleaning disk 12 via opening 16 and a pressure pad 24 (schemetically shown) applies pressure to the outside of the jacket 10 and therefore the disk 12, but is prevented from contacting the cleaning disk 12. The drive system 20 rotates the cleaning disk 12 and includes a clutch (not shown) which grasps the cleaning disk 12. Debris which has accumulated on the magnetic head 22 is dissolved by the cleaning solution and carried away by the cleaning disk 12. The dry portion of the cleaning disk contacts the head after the wet portion of the cleaning disk contacts the head. This wet-dry cycle facilitates cleaning and drying of the heads. Since the fibrous material of the disk 12 is substantially non-abrasive, the drive system 20 may be left engaged for a long period of time without any damage to the magnetic head 22.

FIGURES 3 and 4 show an alternate embodiment of the invention. In these figures the same numerals employed in FIGURES 1 and 2 are employed to designate similar parts. The primary difference between the embodiments shown in FIGURES 3 and 4 and that of FIGURES 1 and 2 is the addition of two isolation means in the form of bridge members 36 and 38 which extend across the opening 16 from portion 19 to portion 21. As shown in FIGURE 4, when the jacket 10 is inserted into the disk drive, the bridge members 36 and 38 contact a pair of pressure pads 24A and 24B and prevent the pressure pads from contacting the cleaning disk 12. It should be noted that the disk drive employed in FIGURE 4 is an arrangement different from that shown or mentioned in connection with FIGURE 2. The disk drive of FIGURE 4 in addition to employing a pair of pressure pads 24A and 24B



utilize a magnetic head 22 located between the pressure pads. On the opposite side of the jacket in an opposed relationship to the pressure pads are structural members 40 and 42 which support the jacket 10 and facilitate operation of the pressure pads 24A and 24B. In this type of disk drive it is common to employ a pair of magnetic heads 22 in direct opposed relationship. In such a disk drive employing two magnetic heads the perforation 18 would be removed and both magnetic heads would be in direct contact with the cleaning disk 12 to enable simultaneous cleaning of both heads. The addition of the bridge members 36 and 38 enables the subject invention to be employed not only in connection with the disk drives as described in connection with FIGURES 1 and 2 but also disk drives such as shown in FIGURE 4. The bridge members 36 and 38 permit the cleaning disk 21 to be rotated at approximately the same speed as if a magnetic disk were employed in the jacket 10; thus enabling the floppy disk drive to operate in the same manner in the cleaning mode as it would operate in a magnetic storage mode.

of the present invention engages drives with dual headed configurations. In the system shown in Figure 5, the perforated portion 18a has been removed so that two opposing heads 22a and 22b contact opposite sides of the cleaning disk 12 so as to facilitate their simultaneous cleaning. In the system shown in Figure 6, offset heads 22a and 22b both engage the cleaning disk 12, while the pressure pads 24a and 24b are left disengaged so that they do not retard the motion of the cleaning disk. As stated previously, the use of a thicker cleaning disk enables the heads in an offset arrangement to com into sufficient contact with the disk to achieve proper cleaning action despite the non-engagement of the pressure pads.

Although the use of a relatively thick cleaning disk is advantageous when cleaning disk drives having an offset head arrangement, the extra thickness presents some problems with respect to the jacket. Since a typical floppy disk and cleaning disk are relatively thin, most jackets have previously been made simply by providing two flat sheets of material and securing them together at their edges, such as by folding one edge over another as shown in Figure 1. When a thick cleaning disk is employed with this type of jacket, pressure from the sides of the jacket results in the cleaning disk having a tendency to drag and stick as it is being rotated. This problem may be overcome by utilizing a modified jacket 50, as is shown in Figures 7 and 8. The jacket 40 is formed with two panels or sheets 52 and 54. One or both of the panels includes an embossed section 52a and/or 54a which is slightly larger in diameter than that of the cleaning disk 12. When the panels 52 and 54 are fastened together, the embossments form a cavity within which the cleaning disk 12 is held. The additional space provided by the cavity permits the thick cleaning disk 12 to rotate freely within the jacket 50. The panels 52 and 54 may be sealed by one of a number of different methods, including but not limited to ultrasonic welding, heat sealing and the use of adhesives. It should be noted that the additional thickness of the jacket 50 caused by the embossments will not interfere with the operation of the disk drive system. Furthermore, the embossed jacket 50 is not limited to use with a cleaning disk, but could also be employed with regular magnetic floppy disks.

ment of the invention employs a jacket 60 which has standard narrow slit openings 62. In addition, separate openings 64 are included in the top side of the jacket 60 to facilitate saturation of the cleaning disk 12. The openings 62 are such that the disk 12 will have little or no tendency to sag through them. Of course, many variations in the size, number and configuration of openings can be devised. The basic consideration is to provide a jacket which facilitates saturation of the cleaning disk while still providing adequate support for the cleaning disk.

BUREAU

In summary, the present invention provides a system which permits convenient cleaning of the magnetic heads in a magnetic disk drive system. This is facilitated by using a jacket having an enlarged saturation opening and carrying a cleaning disk of fibrous and porous absorbent material. The saturation opening or openings must be of a configuration that enables the disk to be supported so as to minimize planar distortions. A cleaning solution is applied to the cleaning disk through the saturation opening until a portion of the cleaning disk is saturated. The jacket containing the disk is then placed within a disk drive system which is then turned on for a period of time so as to clean the magnetic head(s).

BUREAU OMPI WIPO

PCT/US81/01132 WO 82/00731

13

I CLAIM:

5

5

A device for cleaning a magnetic head in flexible disk systems, comprising:

a cleaning disk made of an absorbent and porous material, and adapted to be saturated with a liquid cleaning fluid; and

a substantially flat jacket rotatably supporting said cleaning disk within its interior, said jacket including an opening for exposing said cleaning disk to the magnetic head of a flexible disk system and facilitating saturation of a substantial portion of the cleaning disk with cleaning 10 fluid without requiring removal of said disk from said jacket, wherein said opening is configured so that said jacket provides support to the cleaning disk that prevents any substantial planar distortion of the cleaning disk in the area of the opening. 15

- The device of Claim 1 wherein said cleaning disk has a cleaning solution applied thereto via said opening.
- The device of Claim 2 wherein said opening is 3. generally defined by a straight portion corresponding to a chord of the cleaning disk and a curved portion corresponding to the periphery of the cleaning disk that results in a tapered opening.
- The device of Claim 1 wherein the jacket has two sides, one side including said opening and the other side having a perforated portion that may be removed to form a second opening substantially smaller than said opening.
- The device of Claim 4 wherein said absorbent material is a light color, lint free and fibrous material.



10

15

.14

- 6. The device of Claim 4 wherein said opening in one side of the jacket exposes approximately one-quarter of the surface of said cleaning disk and wherein said second opening formed by the perforation is in opposed position to said first opening.
 - 7. The device of Claim 6 wherein said second opening is an elongated thin radial opening.
 - 8. The device of Claim 1 wherein said jacket has two sides and wherein at least one of said sides includes an embossed portion within which the cleaning disk rests, said embossed portion providing increased space within the jacket so as to facilitate free rotation of the cleaning disk within the jacket.
 - 9. The device of Claim 8 wherein both of said sides are embossed.
 - 10. A device for cleaning a magnetic head in flexible disk systems, comprising:
 - a cleaning disk made of an absorbent and porous material, and adapted to be saturated with a liquid cleaning fluid; and
 - a substantially flat jacket rotatably supporting said cleaning disk within its interior, said jacket including at least one opening for exposing said cleaning disk to the magnetic head of a flexible disk system, and at least one additional opening exposing an area of said cleaning disk sufficient to facilitate saturation of a substantial portion of said cleaning disk with cleaning fluid without requiring removal of said disk from said jacket, wherein said opening is configured so that said jacket provides support to the cleaning disk that prevents any substantial plantar distortion of said cleaning disk in the area of the additional opening.

BUREAU OMPI

15

11. A method for cleaning magnetic heads in a disk system employing a jacket that rotatably supports a cleaning disk within its interior and has a first opening therein and has a perforated portion in opposition to the opening; the steps comprising:

removing the perforated portion to form a second opening;

saturating a portion of said cleaning disk with a cleaning solution via said first opening;

bringing said cleaning disk into contact with two magnetic heads to be cleaned; and

rotating said cleaning disk to alternately contact said head with a wet portion and a dry portion of said cleaning disk.

- 12. The method defined in Claim 11 wherein the cleaning solution employed evaporates in less than three minutes when the cleaning disk is rotated.
- 13. The method defined in Claim ll wherein the material employed for the cleaning disk is an absorbent and porous material, said porous nature of the material enabling foreign particles to be collected by said cleaning disk.
- 14. The method defined in Claim 11 wherein between 1/8 to 1/2 of the cleaning area of the cleaning disk is saturated with cleaning solution.



Fig. 1.

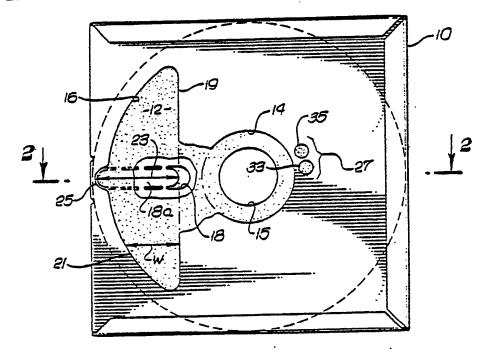
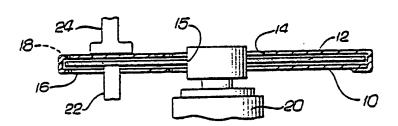


Fig. 2.





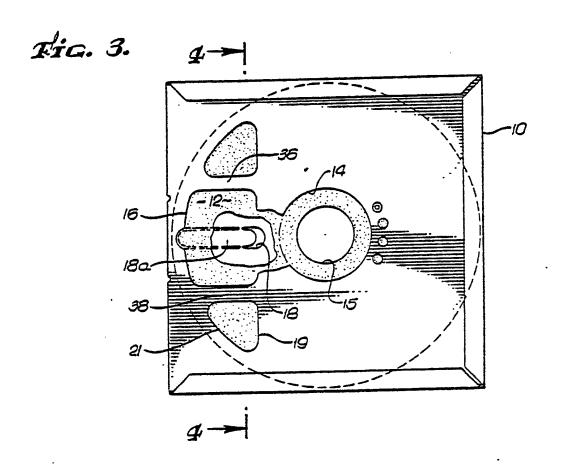
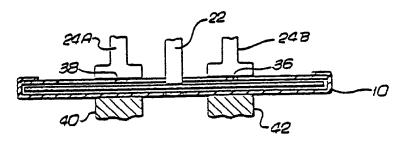


Fig. 4.



BUREAU
OMPI
WIPO
WIPO
WIPO



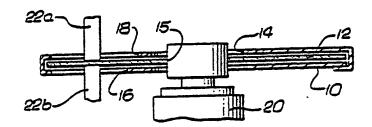


Fig. 6.

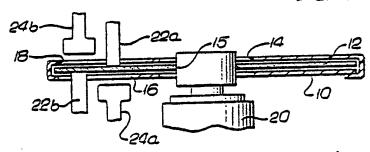


Fig. 7.

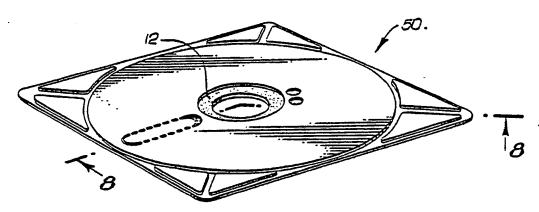
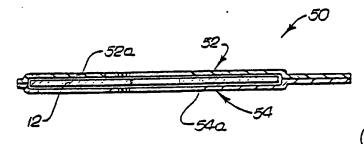
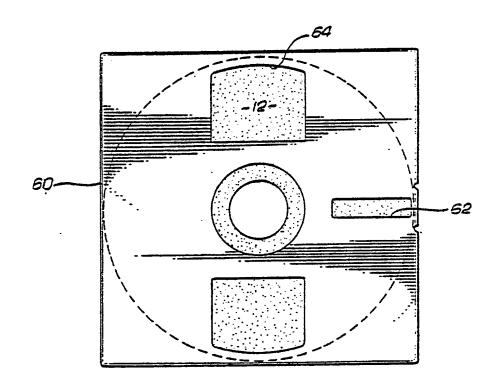


Fig. 8.



BUREAU OMPI WIPO

Fig. 9.



INTERNATIONAL SEARCH REPORT

International Application No PCT/US81/01132

According to intermedical Plant Classification (IPC) or to both Residued Classification and IPC INT. CL2 G 11 B 5/41 U.S. CL. 360/128 IL PELOS SEARCHED Minimum Documentation Searched * Classification System Documentation Searched other than Alinimum Documentation to the State that such Documents are included in the Reids Searched * 360/128, 133, 135, 137, 99 15/210 III. DOCUMENTS CONSIDERED TO BE RELEVANT** Classoff: Classification of Document, 1* with indication, where accompitate, of the relevant seasangue 1* X,P CB, A 2,045,508, Published 29 October 1980 1-14 EAUS, A 4,180,340, Published 22 September 1981 1-14 A US, A 4,180,340, Published 25 December 1979 1-14 ALLAN A US, A 4,180,340, Published 3 August 1973 ALLAN A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Head Cleaner, See page 436. * Seedal categories of cited documents: 1* * And Comment relating to an onal decidears, use, established or state the intermetorinal filling data on the composition of the comp	L CLASSIFICATION OF SUBJECT MATTER (It several classification symposis apply, indicate all) *						
INT. CL2 G 11 8 5/41 U.S. CL. 360/128 IL PELOS SEARCHED Minimum Decumentation Searched * Cassification Symbols U.S. Documentation Searched with the Minimum Occumentation Symbols U.S. Documentation Searched with the Minimum Occumentation Symbols U.S. Documentation Searched with the Minimum Occumentation Symbols Display 133, 135, 137, 99 15/210 III. OCCUMENT'S COMBIDERED TO SE RELEVANT'S Caseopt' Caseon of Occument, 18 with indication, where appropriate, of the relevant passages 11 X/P GB, A 2,045,508, Published 29 October 1980 1-14 ELA US, A 4,291,353, Published 29 October 1980 1-14 A US, A 4,180,840, Published 25 December 1979 ALLAN A US, A 4,180,840, Published 3 August 1978 ALLAN A IBM Technolical Disclosure Bulletin, Volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, See page 436. **Seed deciment dusting the general exist of the srt Table document date of special reason other than those referred to in the date caseopties "**Genument relations to published on or start the interrestions of the interres	L CLASSIFICATION OF SUBJECT MATTER (If several customization symbols captured by the control of						
IL PELOS SEARCHED Minimum Documentation Searched* Cassification Symbols U.S. Documentation Searched what then Minimum Occumentation to the Enset that then Documents are included in the Fledas Searched \$ 360/128, 133, 135, 137, 99 III. DOCUMENTS COMMINERED TO BE RELEVANT to Calvery* Case of Occument, 1s with indication, where approximate, of the relevant passespens 1s X,P GB, A 2,045,508, Published 29 October 1980 L-14 SY, A 4,291,353, Published 22 September 1981 FLETCHER ST AL A US, A 4,180,840, Published 25 December 1979 ALLAN A US, A 4,106,067, Published 3 August 1978 MASUYAMA ET AL A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. *** Secular definition the published on or after the international filing date but no restarched the published on or after the international filing date but on or starched the published on or after the international filing date but on or starched the published prior to the international filing date but on the formation of the international filing date but on or starched the published prior to the international filing date but on or starched the published prior to the international filing date or incompletion of the international Search Report * ** Secular definition or date of the international Search Report * **Occument qualified of the international Search Report * **Occument of published prior to the international filing date or normy date and not in certifies with the acadication to in the other categories **Occument other published prior to the international filing date or normy date and not in certifies with the acadication of the international Search Report * **Occument of learning of Auditorial Published Publish							
**Seedal categories of cried documentation* **A decument distingth and ET AL **A 106.067, Published 25 December 1979 ALLAN **A 1,180, 840, Published 27, Published 3 August 1978 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1978 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 2,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 1,180, 840, Published 3 August 1979 ANSUYAMA ET AL **A 2,180, August 1979 ANSUYAMA ET AL **A 2,180, August 1979 ANSUYAMA ET AL **A 300, August 1979 ANSUYAMA ET AL							
CaseAccision System Classification Searched							
U.S. Confidential Searched other than Minimum Occumentation to the Education that the Education of the Confidence of	IL PIELD	3 JEANG		station Searched +			
U.S. **Secial actsporter of cited documents: It **A 13 13 13 13 13 13 13 1	Consideration	ing Support					
Documentation Septemed other than Minimum Occumentation to the State that seath Occuments are included to the Flade Searched 4 360/128, 133, 135, 137, 99 15/210 III. OCCUMENTS CONSIDERED TO BE RELEVANT ** CAMPORT * Citation of Document, 16 with indication, where appropriate, of the referent Desauque 17 X,P GB, A 2,045,508, Published 29 October 1980	Casana						
Documentation Septemed other than Minimum Occumentation to the State that seath Occuments are included to the Flade Searched 4 360/128, 133, 135, 137, 99 15/210 III. OCCUMENTS CONSIDERED TO BE RELEVANT ** CAMPORT * Citation of Document, 16 with indication, where appropriate, of the referent Desauque 17 X,P GB, A 2,045,508, Published 29 October 1980	1						
The Estant that such Occurrents are included in the Fields Searched 1 360/128, 133, 135, 137, 99 15/210 III. DOCUMENTS CONSIDERED TO BE RELEVANT** Category* Citation of Document, 19 with inclication, where appropriate, of the relevant passages 1 X,P G3, A 2,045,508, Published 29 October 1980 1-14 EA US, A 4,291,353, Published 22 September 1981 1-14 FLETCHER ET AL A US, A 4,180,340, Published 25 December 1979 1-14 ALLAN A JUS, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. **Social categories of cited documents: 15 "A document defining the general state of the art to the international filing date but on or start the international filing date but on or start the international filing date but on or start the international filing date but to the categories of deciment relevant to an oral disclosure, use, stablishon or of comment relevant to an oral disclosure, use, stablishon or the means. IV. CERTIFICATION Deta of the Actual Completion of the International Search 1 NOV 0 3 1981 O 5 NOV 1981 Grantmetional Searching Authority:	IJ.	.s.					
The Estant that such Occurrents are included in the Fields Searched 1 360/128, 133, 135, 137, 99 15/210 III. DOCUMENTS CONSIDERED TO BE RELEVANT** Category* Citation of Document, 19 with inclication, where appropriate, of the relevant passages 1 X,P G3, A 2,045,508, Published 29 October 1980 1-14 EA US, A 4,291,353, Published 22 September 1981 1-14 FLETCHER ET AL A US, A 4,180,340, Published 25 December 1979 1-14 ALLAN A JUS, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. **Social categories of cited documents: 15 "A document defining the general state of the art to the international filing date but on or start the international filing date but on or start the international filing date but on or start the international filing date but to the categories of deciment relevant to an oral disclosure, use, stablishon or of comment relevant to an oral disclosure, use, stablishon or the means. IV. CERTIFICATION Deta of the Actual Completion of the International Search 1 NOV 0 3 1981 O 5 NOV 1981 Grantmetional Searching Authority:				n - Malayar Composition			
### Special categories of cited documents: **Special categories of cited documents: **A Coursent defining the general state of the str **The focument defining the general state of the str **A coursent defining the general state of the str **The focument defining the general state of the str **A coursent defining the general state of the str **A coursent defining the general state of the str **The focument defining the general state of the str **A coursent defining the general state of the str **The focument defining the general state of the str **A coursent defining the general state of the str **The focument defining the general state of the str **The focument defining the general state of the str **A coursent defining of the str **Coursent defining date **Coursent defin			Documentation Searched other to the Estant that such Documents	reg included in the Fields Searched 6			
III. DOCUMENTS CONSIDERED TO BE RELEVANT: CAUSON 1 Catton of Document, 19 with indication, where appropriate, of the relevent passages 12 X,P G3, A 2,045,508, Published 29 October 1980 1-14 FA US, A 4,291,353, Published 22 September 1981 1-14 A US, A 4,180,840, Published 25 December 1979 1-14 ALLAN A US, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Head Cleaner, see page 436. *Seedal categories of cited documents: 19 "A" document defining the general state of the err Thing date to the categories of the document defining the general state of the err "It document defining the general state of the err Thing date to the categories of deciment relevant to in the other categories of document relevant to an oral deciment, use, exhibition or of document relevant to an oral deciment, use, exhibition or of document relevant to a noral deciment, use, exhibition or of document relevant to an oral deciment, use, exhibition or of the Actual Competion of the international Search Report 1 NOV 0 3 1981 Gas of Mailing of this international Search Report 1 O 5 NOV 1981 Gas of Mailing of this international Search Report 1 A LIFE OF THE ACTUAL Competition of the international Search Report 1 O 5 NOV 1981		27130			•		
III. DOCUMENTS CONSIDERED TO BE RELEVANT. CAMPORT! Charlon of Document. 1s with indication, where appropriate of the relevant passenges 1! X,P GB, A 2,045,508, Published 29 October 1980 1-14 FLETCHER ET AL A US, A 4,180,840, Published 25 December 1979 1-14 ALLAN A US, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Head Cleaner, see page 436. * Seedal categories of cited documents: 1s			, 133, 135, 137, 99				
Category* Citation of Document, 19 with indication, where appropriate, of the relevent parameters? X,P GB, A 2,045,508, Published 29 October 1980 1-14 FA US, A 4,291,353, Published 22 September 1981 1-14 A US, A 4,180,840, Published 25 December 1979 1-14 ALLAN A US, A 4,180,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Head Cleaner, see page 436. *Seedal categories of cited documents: 19 *A document defining the general state of the err tender document in ubulished on or siter the international filing date on or state the order categories of cited for special reason other than those referred to in the other categories of comment referred to in the other categories of the Actual Competition of the international Search 19 IV. CERTIFICATION Category ** Categories of cited documents; 19 of Nov 1981 ** **Constructional Searching Authority** **Con	3)/ ZIU					
Category* Citation of Document, 19 with indication, where appropriate, of the relevent parameters? X,P GB, A 2,045,508, Published 29 October 1980 1-14 FA US, A 4,291,353, Published 22 September 1981 1-14 A US, A 4,180,840, Published 25 December 1979 1-14 ALLAN A US, A 4,180,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Head Cleaner, see page 436. *Seedal categories of cited documents: 19 *A document defining the general state of the err tender document in ubulished on or siter the international filing date on or state the order categories of cited for special reason other than those referred to in the other categories of comment referred to in the other categories of the Actual Competition of the international Search 19 IV. CERTIFICATION Category ** Categories of cited documents; 19 of Nov 1981 ** **Constructional Searching Authority** **Con	Ì						
Category* Citation of Document, 19 with indication, where appropriate, of the relevent parameters? X,P GB, A 2,045,508, Published 29 October 1980 1-14 FA US, A 4,291,353, Published 22 September 1981 1-14 A US, A 4,180,840, Published 25 December 1979 1-14 ALLAN A US, A 4,180,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Head Cleaner, see page 436. *Seedal categories of cited documents: 19 *A document defining the general state of the err tender document in ubulished on or siter the international filing date on or state the order categories of cited for special reason other than those referred to in the other categories of comment referred to in the other categories of the Actual Competition of the international Search 19 IV. CERTIFICATION Category ** Categories of cited documents; 19 of Nov 1981 ** **Constructional Searching Authority** **Con	III. DOCI	IMENTS	ONSIDERED TO BE RELEVANT "				
Social extreports of cited documents: * Social extreports of cited documents: * NOV 0 3 1981 L-14			ion of Document, 16 with indication, where app	ropriets, of the relevant passages 17	Relevant to Claim No. 18		
US, A 4,291,353, Published 22 September 1981 1-14 A US, A 4,180,840, Published 25 December 1979 1-14 ALLAN A JJS, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, S.W. Mace, Sound Read Cleaner, see page 436. **Social categories of case documents: 1* "A" document defining the general state of the art seeder document but published on or after the international filing date but on or after the art state of art state of the ar		}	1 2 0/5 500 7 111				
*Social estegories of cited documents: A US, A 4,106,067, Published 3 August 1978 A US, A 4,106,067, Published 3 August 1978 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, 5.W. Mace, Sound Read Cleaner, see page 436. *Social estegories of cited documents: A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, 5.W. Mace, Sound Read Cleaner, see page 436. *To state document but published on or after the international filing date but on or after the orienty date claimed to in the other exagories *To document cited for social reason other than those referred to in the other exagories *To document referring to an orial disclosure, use, embition or other means IV. CERTIFICATION Date of the Actual Competion of the international Search : NOV 0 3 1981 *Social estegories of cited documents: *Document outlished prior to the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in the international filing date but on or after the orienty	x,P	GB,	# 4,045,508, Published	1 29 October 1980	1-14		
*Social estegories of cited documents: A US, A 4,106,067, Published 3 August 1978 A US, A 4,106,067, Published 3 August 1978 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, 5.W. Mace, Sound Read Cleaner, see page 436. *Social estegories of cited documents: A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, 5.W. Mace, Sound Read Cleaner, see page 436. *To state document but published on or after the international filing date but on or after the orienty date claimed to in the other exagories *To document cited for social reason other than those referred to in the other exagories *To document referring to an orial disclosure, use, embition or other means IV. CERTIFICATION Date of the Actual Competion of the international Search : NOV 0 3 1981 *Social estegories of cited documents: *Document outlished prior to the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in cannical or the international filing date but on or after the orienty date and not in the international filing date but on or after the orienty	-,	וופ	4 4 201 252 Bublished	1 22 Santambar 1081	1-14		
Social estegories of cited documents: * Social estegories of cited documents: * N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. * Cocument defining the general state of the srt * See after document but published on or after the international filing date but on or after the other categories **Cocument definition or after the international filing date but on the other categories **Of document referring to an oral disclosure, use, estibition or other means V. CERTIFICATION	7.3			r 55 Jebremner 1901	1-27		
A JJS, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. *Social assegories of crade documentar; Ibmark and the second state of the street and the second state of the street and the document defined the general state of the street and the street occurrent gublished and rate the international filing date of the street occurrent gublished and the candication, but clied to understand the street the international filing date of the street categories To document reterring to an oral deciosure, use, exhibition or the international filing date of the street categories IV. CZRTIFICATION Date of the Actual Competion of the international Search? NOV 0 3 1981 Trustrational Searching Authority Signature of Authorities Officer 19 A JIT JA JA International Searching Authority			Juli 11 ab				
A JJS, A 4,106,067, Published 3 August 1978 1-14 A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. *Social assegories of crade documentar; Ibmark and the second state of the street and the second state of the street and the document defined the general state of the street and the street occurrent gublished and rate the international filing date of the street occurrent gublished and the candication, but clied to understand the street the international filing date of the street categories To document reterring to an oral deciosure, use, exhibition or the international filing date of the street categories IV. CZRTIFICATION Date of the Actual Competion of the international Search? NOV 0 3 1981 Trustrational Searching Authority Signature of Authorities Officer 19 A JIT JA JA International Searching Authority	4	US.	4 4.180.840. Published	25 December 1979	1-14		
* Social extegories of cited documents: 1* * Social extegories of cited documents: 1* * A N IBM Technical Disclosure Bulletin, volume 22, No. 2, issued July 1979, E.W. Mace, Sound Read Cleaner, see page 436. * Social extegories of cited documents: 1* *A" document defining the general state of the art filling date of the cited occurrent but published and or after the international filling date for in the other extragories of cited to understand the articular referred to in the other extragories **Occurrent referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Competion of the international Search 1 NOV 0 3 1981 International Searching Authority 1 Signature of Authoritaed Officer 19 A 1 1 = 1 1/1 7 International Searching Authority 1				. 19 10000000000000000000000000000000000			
*Social categories of stad documents: 19 *A" document defining the general state of the arc * serier document that published on or after the international filing date *1" document cited for social reason other than those referred to in the other exagories *O document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Compression of the international Search 1 NOV 0 3 1981 International Searching Authority 1 Signature of Authorityd Officer 19 A 11=1000		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	•	•	· ·		
*Social categories of stad documents: 19 *A" document defining the general state of the arc * serier document that published on or after the international filing date *1" document cited for social reason other than those referred to in the other exagories *O document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Compression of the international Search 1 NOV 0 3 1981 International Searching Authority 1 Signature of Authorityd Officer 19 A 11=1000	A	JJS.	4 4.106.067, Published	8 August 1978	1-14		
*Seedal estegories of cred documenta: 18 *A" document defining the general state of the art *E" serier document but published on or after the international filing date 10 document defining that published on or after the international filing date 11 document defining the general state of the art 12 document defining the general state of the art 13 document defining date 14 document defining the general state of the art 15 document defining the general state of the art 16 document defining the general state of the art 18 document defining date out or after the international filing date out or after the priority date claimed 19 document defining the general state of the art 19 document defining the general filing date out or after the priority date claimed 19 document defining the careful filing date out or after the international filing date of a determined and not in conflict with the application, the time for animals or priority date claimed 19 document defining the defining date out or after the international filing date out or after the priority date claimed 10 document defining the defining date out or after the international filing date out or after the priority date claimed 19 document date of the international filing date out or after the international filing date out or after the priority date claimed 10 document date of the international filing date out or after the in							
*Seedal estegories of cred documenta: 18 *A" document defining the general state of the art *E" serier document but published on or after the international filing date 10 document defining that published on or after the international filing date 11 document defining the general state of the art 12 document defining the general state of the art 13 document defining date 14 document defining the general state of the art 15 document defining the general state of the art 16 document defining the general state of the art 18 document defining date out or after the international filing date out or after the priority date claimed 19 document defining the general state of the art 19 document defining the general filing date out or after the priority date claimed 19 document defining the careful filing date out or after the international filing date of a determined and not in conflict with the application, the time for animals or priority date claimed 19 document defining the defining date out or after the international filing date out or after the priority date claimed 10 document defining the defining date out or after the international filing date out or after the priority date claimed 19 document date of the international filing date out or after the international filing date out or after the priority date claimed 10 document date of the international filing date out or after the in		ļ		•			
*Seedal extegories of cited documentar: 19 *A" document defining the general state of the art *Seedal extegories of cited documentar: 19 *A" document defining the general state of the art *Seafier document but published on or after the international filing date *I" document cited for special reason other than those referred to in the other extended are or or after the international filing date on or after the international filing date or or or after the priority date citained *T later document published on or after the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date but on or after the priority date citained *T later document published prior to the international filing date on or or after the priority date citained *T later document published prior to the international filing date on or or after the priority date citained *T later document published prior to the international filing date on or after the priority date citained *T later document published prior to the international filing date on or after the priority date citained *T later doc	A				1-14		
* Special estagories of cited documents: 19 "A" document defining the general state of the art "Safer document but published on or after the international filling date on or after the priority date claimed to in the other estagories "O document reterring to an oral disclosure, use, estibition or other means IV. CERTIFICATION Date of the Actual Completion of the international Search 1 NOV 0 3 1981 O S NOV 1981 Signature of Authorized Officer 19		V (olume 22, No. 2, issue	d July 1979,			
Special categories of cited documents: I *A" document defining the general state of the art *E' seriler document but published on or after the international filling date *I' document cited for special reason other than those referred to in the other categories *O' document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Competion of the International Search * *NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19				leaner,	į		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		S	ee page 436.		!		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		i			i		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		l					
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		ĺ					
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19							
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19			_		Ì		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		!			ļ		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19				•	į !		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		ĺ			1		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		İ			1		
"A" document defining the general state of the art "E" saffer document but published on or after the international filling date "L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Cate of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorized Officer 19		<u> </u>			·		
"I document but published on or after the international filling date "I" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Completion of the international Search : NOV 0 3 1981 O 5 NOV 1981 Signature of Authorited Officer 19 A 11=11/2	AAR ACCOUNTS AND AND AND AND AND AND AND AND						
"L" document cited for special reason other than those referred to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Completion of the international Search 2 NOV 0 3 1981 International Searching Authority 4 Signature of Authorized Officer 19	E sariler document but published on or after the international on or after the priority date claimed						
to in the other categories "O" document referring to an oral disclosure, use, exhibition or other means IV. CERTIFICATION Date of the Actual Completion of the International Search ** NOV 0 3 1981 International Searching Authority ** Signature of Authorized Officer ** Signature of Authorized Officer **	" " (mer cocument pugusaned on or siter ine international nung						
or other means IV. CERTIFICATION Date of the Actual Completion of the International Search 2 NOV 0 3 1981 International Searching Authority 4 Signature of Authorized Officer 19	to in the other extendines but cited to understand the principle or theory underlying						
IV. CERTIFICATION Case of the Actual Completion of the International Search 2 NOV 0 3 1981 O 5 NOV 1981 International Searching Authority 4 Signature of Authorized Officer 19	"O" document referring to an oral disclosure, use, exhibition or						
NOV 0 3 1981 0 5 NOV 1981 International Searching Authority 1 Signature of Authorized Officer 19							
International Searching Authority Signature of Authorized Officer 19							
International Searching Authority Signature of Authorized Officer 19	\$ · · · · · · · · · · · · · · · · · · ·			OF NOV 1991			
11=111	404 0.2 isos						
ISAMO ADTADOMEN	International Searching Authority 5 Signature of Authorized Officer 19						
	154/115		ICATUC	1 4 7 Solower			